UNIVERSITI TEKNOLOGI MARA

DECOLOURIZATION OF TEXTILE EFFLUENT BY ADSORPTION ON NAOH TREATED TEXTILE VENUS CLAM (PAPHIA TEXTILE)

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ABSTRACT

In this work the feasibility of employing Textile Venus Clam (TVC) to remove Basic Red 46 (BR46), an azo dye from its aqueous solutions was investigated. The parameters that influence the adsorption process such as adsorbent dosage, initial dye concentration and contact time were studied in batch experiments. The adsorption of Basic Red 46 was took place at neutral pH of 7 and room temperature. Furthermore, the adsorbent was characterized by using Brunaeur-Emmett Teller (BET) to study the surface area of the adsorbent. The TVC was washed using deionized water and treated with NaOH solution. Then the adsorbent was dried for 24 hours at 100˚C. The adsorbent then crushed and calcined at 400, 500 and 600˚C for 3 hours and stored. For the effect of adsorbent dosage, a range of dosage from 0.3-0.9g of adsorbent in 100mL of 20 ppm of BR46 solution. The process was carried out for 60 minutes in an orbital shaker at 200 rpm. For the effect of initial dye concentration, the optimal dosage was used and a range of initial concentration from 20-60 ppm of BR46 solution. The solution was shake for the same time and speed. The samples were filtered by using filter paper and the dye concentration was measured using UV-Vis Spectrophotometer. The BET analysis showed that the adsorbent has BET surface area of 2.4758 m2/g and pore volume of 0.003754 cm3/g. The highest adsorption of BR46 was at 0.9g adsorbent dosage which is 87.48% removal. The highest removal for initial concentration of 20 ppm concentration of dye was 87.6% removal. Thus, it was concluded that TVC can be used effectively as an adsorbent fort the removal of BR46 from aqueous solution.

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CHAPTER 1

INTRODUCTION

1.1 RESEARCH BACKGROUND

The world nowadays is having a big environmental problem such as climate change, pollutions, land degradation, nuclear issues and others. These problems will not only affect our life style but also the future generations. Like colouring agents or dye, they had been polluting the environment because of the increasing demand in industries and had become a serious concern (Rafatullah, Sulaiman, Hashim, & Ahmad, 2010). There are many types of dye that are used by the industries as their colouring agents (Anastopoulos & Kyzas, 2014). Dyes like Methyl Orange, Methyl Red, Malachite Green and Methylene Blue are major pollutants of fresh water reserves because of their toxic and carcinogenic properties (Mane & Babu, 2011; Mane & Vijay Babu, 2013; Yagub, Sen, Afroze, & Ang, 2014).

The discharge of dues into the receiving water causes a big concern from the environmental point of view. Several industries that are polluting the fresh water with dyes such as textile industry, batik industry, paint industry and printing ink production (Rashidi, Sulaiman, & Hashim, 2012; Wang, Zhu, Jiang, Hu, & Shen, 2016). Damage had done to the environment because of the failure in treating the wastewater whether it is from the industrial and domestic. It is also affecting the human health and cause problems such as organ damage, reduced growth and development, nervous system failure oxidative stress (Dahri, Kooh, & Lim, 2015; Subramaniam & Kumar Ponnusamy, 2015). That is why it is very important to remove or reduce the dyes before it is discharge into the environment.